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ADDRESS IN SURGERY,

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BY

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S U M M A R Y.

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ADDRESS IN SURGERY.

MR. PRESIDENT AND GENTLEMEN,—When I was honoured by the request of your Council to give the Address in Surgery, I asked to be allowed a short time to consider how far I would have leisure to prepare an address worthy of the occasion; for, in addition to my winter's avocations, I was engaged in a work which it was necessary to finish before the commencement of another session. I knew, moreover, that addresses were not my *forte*, and that any attempt of mine must fall far short of the elegance in composition or the eloquence which had characterised the addresses to which you were accustomed. But, on consideration, I felt that my position as Professor of Surgery in this University; the long experience I had enjoyed as Surgeon to the Royal Infirmary, and the length of time I had been connected with the Edinburgh Medical School, demanded that I should not shrink from the duty of doing my utmost in response to the invitation with which I was honoured: I consented the more readily, that I felt sure that the members of the Association would, as practical men, look rather to the matter than to the manner of my address.

Having accepted the situation, I had not much difficulty in choosing my subject. My avocations as a hospital surgeon and teacher of surgery necessarily forced on my attention the changes taking place in our views of disease and in the practice of surgery. I decided to review the progress of surgery in relation to its past, limiting myself necessarily to a few departments, from the impossibility of overtaking the whole range of the subject.

I believe it is only by reviewing the advance in relation to the past, that we will be able to estimate what real progress our science has made, and in what that progress consists, whether in the discovery of something absolutely new, or in modifying and improving methods of treatment, the intrinsic value of which had not been fully appreciated, or which had fallen into disuse owing to the imperfect method in which the principle had been carried out. In regard to things absolutely new, we might almost echo the saying of Solomon: "Is there anything whereof it may be said, See, this is new? It hath been already of old time, which was before us."

Looking at some of the more prominent recent changes in surgical practice, a superficial observer might almost imagine that instead of progressing, our science moved in a cycle; and were he inclined to be cynical, he might suggest that we had revolved back to the period of sheer mechanical forces, complicated dressings, and red-hot knives. A nearer and more appreciative examination will show us, however, that even in cases where the principle is not new, the method of apply-

ing it has been so modified and improved as to constitute a real advance and addition to our resources. Let me take as an example of this, a method of treating fractures of the lower extremity now much used—*extension by weight and pulley*.

The great tendency to shortening and deformity in cases of fracture of the thigh-bone, owing to the contraction of the powerful muscles which surround it, could not but attract the attention of those called upon to treat such injuries; and hence, from the earliest times, surgeons were naturally led to try to overcome the displacing causes by opposing force to force by means of *extension* and counterextension. The principle of extension is now almost universally admitted to be best in these fractures; but the method by which it is applied makes all the difference. Those who first applied the principle seem to have had in view rather what mechanical forces could effect, than what the living body could bear. You have only to look at the formidable machinery they employed for the purpose, such as the bed of Hippocrates, the “organon”, and the various forms of glossocoma, different kinds of racks and windlasses, in fact, to understand how a revulsion of feeling in the profession should have at one time led to the abandonment of the extension treatment in fractures of the thigh-bone, and to the adoption of the method of laying the limb on its outside, with the leg bent on the thigh, and the thigh bent on the pelvis—a principle of relaxing powerful muscles which had proved most useful in fractures of the leg, but which, for obvious causes, proved most disastrous in those of the thigh. The abuse of a power is not a reason for abandoning its use: we would do better to examine into it, and try whether it be not capable of improvement. I fear, however, human nature has a bias to extremes; and so we often miss making improvements on methods of treatment until they suddenly reappear as novelties, and are accounted, and properly so, as marks of progress. Mr. John Bell, in his great work on *Surgery*, speaking of the machines used in treating fractures, says: “I may, perhaps, do you some service by explaining the simple principles of this department of surgery; and then you will be able to enter the magazines of Scultetus, Hildanus, and Pareus, filled with engines not unworthy of the chambers of the Inquisition, without being tempted to bring out along with you any of their lumber.” Accordingly, he does enter the magazines of apparatus, and criticises them with his usual seathing sarcasm. Amongst other “lumber”, he unhangs from the walls of the magazine of Hildanus a weight with circle and strap for hanging from the ankle, and drags to light a bed with a surengle or perineal band of horse-girth for fixing the body to the upper part of the bed; and on this rude apparatus for permanent extension he makes ironically laudatory remarks. Mr. Bell would have been better employed if, when he exhibited the rude apparatus of Hildanus, and admitted its power of maintaining permanent extension, he had thoughtfully considered how its defects might be removed, and it might be converted into a simple and effective means of treating fractures of the lower extremity. Let me again take the dust off this bed and weight of Hildanus, and place them alongside some modern surgical upholstery, and see how like they are. Here is the weight and pulley method copied from a recent work on surgery. How very like! The perineal band or surengle fixing the patient; the weight hanging from the foot through the pulley fixed at the foot of the bed. But how is the weight hung from the limb? No longer by a circular strap round the ankle, acting on one part only, and so unendurable, but to long plasters fixed to and embracing a great breadth

of the limb from immediately below the fracture, and so diffusing pressure that the patient feels no inconvenience, and is scarcely sensible of the extending force. That makes the difference. But something is still wanting to its perfection. Can we get rid of that perineal band, which proves so troublesome to patient, and surgeon, and nurse? How can we dispense with it, and maintain a counteracting force to the extension from the foot? Tilt up the lower end of the bed; place blocks of wood below the feet of the bed; take off the perineal band, and let the body be the counterextending force; and there you have the simplest, least irksome, and most perfect method I know of treating fractures of the thigh, and, if possible, still more useful in treating oblique fractures of the tibia. Until a comparatively recent date, I seldom used anything but the long splint for the purpose of extension and counterextension; and several years ago I drew special attention to what I considered essential to its proper use, viz., maintaining a moderate amount of extension during treatment, more especially when the fracture was oblique; and, so far as the results of my practice were concerned, I had little reason to abandon the long splint for any other method. But it is impossible for any one who has had much experience in its use not to feel that it had defects, and that much care is required to prevent troublesome results, and to overcome some difficulties. I may mention, for example, the tendency to fretting and excoriation of the soft parts, caused by the perineal band or extensor, and by the handkerchief which was generally used for fixing the foot to the splint. Nay, unless great attention was given, the pressure of the handkerchief sometimes gave rise to sloughing, especially in old or very young patients. Indeed, for some years before I began to use the pulley-extension, I had used plasters as the means by which I fixed the foot to the lower part of the splint, so as to obviate the bad effects of the handkerchief round the ankle and instep, and also as maintaining extension in a more direct line, and preventing any eversion of the foot; and I would strongly urge this modification whenever the long splint is used. But there still remained the inconvenience and irritation caused by the perineal band, and the frequent necessity of changing it for cleanliness; and when this band is removed, of course all extension and counterextension cease for the time, unless kept up by assistants; and there is risk of displacement occurring. Another troublesome though less serious effect was the stiffness of knee when the splint was removed at the end of six or seven weeks; and, in some patients of rheumatic diathesis, or those who would not tolerate early passive motion being used, I have known a considerable amount of stiffness remain for years. My predilection for, and my favourable experience in the use of, the long splint, made me very unwilling to abandon it; but, having to treat a compound fracture of the thigh where the wound was so placed that even the bracketed long splint could not be used, I tried the extension-pulleys, and found that method so effective, that I tried it in ordinary cases, and have found it so simple and effective, so much more comfortable for both patient and surgeon, that I now rarely use the long splint—almost never, except for clinical instruction, that students may see more than one method of treatment. Now, after some years' experience in the use of the extension-pulleys in fractures of the thigh in very young children and in adults, in fracture of the neck of the femur in old persons, and in long oblique fractures of the tibia, I unhesitatingly commend the method to all who may not have tried it. Of course, in fractures of the shaft of the femur, lateral splints are required, just as when we use the long splint,

and also for lateral support in fractures of the leg. When there is much bruising, however, I merely use sand-bags to prevent lateral displacement; and I also prefer deep sand-bags to prevent rolling of the limb outwards in fractures of the thigh, to a long lateral splint, as used in America. In fact, the full advantages of the extension-pulley method are only secured when we abandon the perineal *lacque* and long lateral splint, and make the body the counterextending force.

Looking at the extension method, as thus improved and simplified, I think we may fairly reckon it as progress in a most important department of surgery; but, whilst we congratulate ourselves on our advance, and replace the bed and weight of Hildanus in the *armamentarium antiquorum*, let us regard it not as "lumber", but reverently with the homage due to the perception of a true principle, however rude in design and execution the apparatus may be.

The use of plasters, as enabling us to fix apparatus, is capable of numerous applications; and in transverse fractures of the patella, I have used it with advantage to enable me to approximate and retain the fragments, by means of Malgaigne's hooks, without penetrating the skin.

The Process of Union in Fracture has been long a subject of discussion. The old Arabian physicians wrote of the ossifying juices poured out from the broken bone—the *callus*; and surgeons long exercised themselves how to restrain within due bounds the exuberant supply by bandaging-friction, and even by scraping, as recommended by Abulcasis. Speaking of the ideas regarding the exudation of new material for repair of fracture in his day, Mr. John Bell says that many certainly regarded it as "something poured out like lead from a plumber's ladle"; and really if we look to some expressions used, and views held, in our own highly scientific age, I hope I will not be considered uncharitable if I cannot help thinking some such views still exist. What, for example, about that beautiful provision of Nature, provisional callus, figured and described in not a few modern works? Does it exist as a necessary part of union if the broken bone be properly adjusted and carefully retained in position? Is it true that the fibrine of the blood, extravasated from the vessels of the broken bone and the torn tissues, is valuable as a concrete, which is to become organised and ossified, and make the broken part, to use a common expression, stronger than before? I would not venture utterly to deny the correctness of such views and such beautiful provisions of Nature; but this I know, that I have had a few opportunities of examining very recently united fractures in persons who died suddenly from other causes, and in such cases I have never seen trace of the changes described. A little thickening and vascularity of the periosteum, a narrow line of new ossified material, barely perceptible between the broken surfaces, were all the changes visible in the injured bone; but in these cases the fractures had been properly adjusted and retained in position from the first. Might I hint that, to some extent at least, the views to which I have alluded are the result of misinterpreted facts, observations of experiments on animals, or of what is seen in badly or irregularly united fractures?

When the femora of rabbits or dogs are fractured, and the animals killed to ascertain the changes which occur at different periods after the injury, great extravasation of blood into the tissues, and around and between the broken ends of the bone, is a very marked condition in that early stage; and, somewhat later, inflammatory infiltration of the intermuscular connective tissue, and amongst the fibres of the muscles, is superadded, giving rise to consolidation of the parts around the broken bone and for some distance beyond. These phenomena

are the result of the laceration of texture and irritation produced by unrestrained movements of the broken fragments. Every movement excites spasmodic muscular action, and, consequently, more laceration and irritation, until the extravasation of blood and inflammatory infiltration interfere and prevent the muscles from acting, and, at the same time, serve as a sort of retentive apparatus to the fractured bone. In badly adjusted fractures, when there is overlapping, or in comminuted fractures, when the fragments render the fractured surfaces irregular, the new material is furnished in larger amount to fill up the inequalities; but even in such cases, not to the extent that the feeling of the mass in the limb would lead us to suppose, for the bulk of that is chiefly due to overlapping; and it not unfrequently happens that, in comminuted fractures, partly detached fragments become imbedded in the muscular or connective tissues of the limb, and the new ossific matter so deposited has led some authorities to assume that the extravasated blood has become organised and ossified. Now, whilst the conditions seen in the experiments on animals or in irregularly adjusted fractures may, if you like, be termed provisional, inasmuch as they help Nature's unassisted efforts towards repair under disadvantageous circumstances, I do not believe in such provisional callus being formed when the fracture is well adjusted and retained in position, and muscular action prevented. Nature is not capricious: the healing process is the same in bone as in other textures; the smallest amount of new material is used for reunion. Just as a wound of the soft parts heals with a fine linear cicatrix, if its surfaces be carefully adjusted and retained and undue excitement prevented; whilst a similar wound, left to itself and subjected to irritation from movement or other causes, inflames, suppurates, and heals by broad irregular scar; so in fracture, if properly set and treated, there will be no ferule or mass of provisional callus at the fractured point.

Refracture in Badly Set Fractures.—Refracture and readjustment of a badly united fracture, when the bone has thoroughly consolidated, is a proceeding which, although popularly believed to be frequently resorted to by surgeons, is one which has been rarely practised since the beginning of the present century. Readjustment, however, by bending over the knee, or by pressure and counter-pressure in the case of deformed and recently united fractures, has often been effected; but interference with a badly united fracture, after months have elapsed, has generally been regarded as improper, and likely, from the force required, to lead to serious risk, with little chance of restoring the limb to better form or usefulness. Yet in early surgery, refracture seems to have been a common proceeding amongst Arabian surgeons. Abulcasis, who objected to the practice, reprobates it in strong terms: but if his remedies for softening and diminishing exuberant callus failed, this same Abulcasis had no hesitation in recommending resection of old fractures. "If the distortion be old and firm", says he, "cut across the bone and saw off all that is superabundant, whether of the bone or callus." And he further remarks to his pupils, "that study and practice will make them very expert in the operation". Here, again, we find ourselves coming back to old methods, for amongst our most recent advances, more especially since subcutaneous and subperiosteal operations have been introduced, resections to remove deformity resulting from ankylosis or badly set fractures have been practised with much advantage. The operative proceedings have been varied—sometimes weakening the point wished to be broken—by drills or narrow saws or osteotomes, sometimes by direct section by saws or chisels. Even yet, however, the

cases are rare in which surgeons have ventured to break thoroughly consolidated fractures by direct force to remove deformity. No doubt, when we think of the degree of force to be applied, and look at the apparatus necessary for the purpose, a feeling of repugnance arises in the mind; but some things look worse than they really are. I make these remarks in reference to a method of refracture and readjustment of old badly set fractures of the femur, introduced to the notice of the profession by Mr. Butcher of Dublin. Mr. Butcher's case was a fracture of the thigh, attended with great deformity and shortening, in a young man who had met with the injury upwards of six months before he consulted Mr. Butcher. Any one who looks at the photographs of the limbs in that case before and after the operation of refracture, will, I think, agree with me, that it is a triumph of surgery. But when you look on the actual apparatus by which this triumph was obtained, you might be inclined to use the language of John Bell in reference to some ancient apparatus, that it was "an engine of torture fit only for the Inquisition". I have, however, had an opportunity of testing this apparatus, and can state to you that it produced none of the torture or bad effects its appearance might suggest. It happened that at the time I received Mr. Butcher's account of his case of refracture, I was considering that of a patient who had come from the backwoods of Canada to consult me, and ascertain if I could do anything for deformity and great shortening of the limb, resulting from a fracture of the femur he had sustained about two years before. The limb was four inches shorter than the sound one, and a large knee of bone projected, giving rise to great deformity; and, what was worse, the peroneal division of the popliteal nerve had suffered, and the extensor and peroneal muscles were paralysed. The case was most unfavourable, both as regarded the form of the fracture and the length of time it had been consolidated, whilst the paralysis of the foot made me doubtful of any interference; but, seeing that he had come a long distance as a last hope, I determined to try what could be done.

By using galvanism after dividing the tendo Achillis, some increase of muscular power and development was obtained, and I had made up my mind to partially resect the fracture with a narrow saw, and then break it through, when the report of Mr. Butcher's case was opportunely sent me. On carefully and anxiously studying it, and communicating with Mr. Butcher, I had his apparatus made and refractured the bone; and though, owing to the unfavourable nature of the case, the result will not compare with Mr. Butcher's, yet the operation has greatly improved the length and form of the limb, whilst the patient has suffered no constitutional disturbance, and scarcely any local irritation from what seemed an application of great and direct force. That the apparatus admits of much modification and improvement to adapt it for acting on different forms of fracture, I doubt not; but its efficiency and safety even in its present form has, I think, been proved, and, although the necessity for such operations is daily diminishing, owing to the advance of surgical skill, yet, in cases such as those fractures which occur when the patients are at a distance from medical aid, it is well to have it in our power by simple and safe means to remedy these terrible deformities even after some time has elapsed.

Operations for the Cure of Ununited Fractures cannot be mentioned either amongst recent acquisitions or revivals of surgical resources, for such operations have long been practised. Many improved methods, however, have been introduced in comparatively recent times, such as Dieffenbach's method of resecting and pegging the resected ends of the

bone, a method which has been specially successful in oblique fractures of the tibia. In a case recently reported from the practice of Professor Volkmann of Halle, a very neat and ingenious adaptation of this method has proved successful in an ununited fracture of the femur, in which the ends of the bones after resection were chiselled into a steplike form on their opposed surfaces, and so were accurately fitted to each other and pegged. Success in resection of the femur or humerus in such circumstances has not, however, been eminently successful. Even in cases where constitutional dangers were avoided, the reunion has not often taken place. In 1854, I proposed and carried out successfully a modification of resection in an ununited fracture of the humerus, by cutting down upon and merely separating the fibrous texture between and around the broken ends of bone, and snipping them off only to a small extent with strong bone pliers, carefully avoiding the use of the saw, or complete protrusion of the bone during section, so as to have as little disturbance of parts as possible, that the action on the ends of the bone should resemble the nature of fracture, and that the amount of bone removed should be merely enough to open up its texture. Since then I have, on several occasions, used this form of resection successfully. There is, however, a method of treating ununited fractures, especially at an early period, which I do not think has had sufficient notice taken of it, nor been sufficiently or fairly tried; I mean the plan proposed and practised by my predecessor in this University, the late Professor Miller. The method consists in entering subcutaneously a long narrow but strong knife; passing it on to and between the ends of the ununited bone, dividing freely the fibrous union, scraping the ends of bone, and slightly separating the periosteum; then the limb is carefully firmly bandaged and placed in appropriate splints. I know that this plan has never had much favour; perhaps it seemed too simple to effect the purpose, and it was derided and declared to be inefficacious by some who professed to have tried it. But I also know that I have frequently used it and have generally found it successful when the knife has been effectively used, and the after treatment carefully carried out. I have, indeed, so strong an opinion of the efficacy of this method in comparatively recent cases, that I do not think it warrantable to proceed to severer measures until this simple one has been fairly tried, and I purposely mention it here to press it on the attention of the profession.

The Subperiosteal Method.—From the progress in the surgery of fractures, I am almost inevitably reminded of some of the most brilliant improvements in surgery arising from our advance in the knowledge of the anatomy and physiology of the periosteum and the nutrition of bone. With the progress of this department of surgery the name of Ollier of Lyons must always be connected, as the man who has given it the greatest practical impetus; but those who recollect the experiments of the late Professor Syme, and the memoirs of the late Professor Goodsir on the structural anatomy and nutrition of bone, must credit these eminent men with no small share of our advance. The practical application of the subperiosteal method of operating is perhaps seen to the greatest advantage in such operations as that for closing the cleft in the hard palate, and in partial removal of bone in some conservative operations.

In excisions of joints, I think the subperiosteal method must be used with discrimination. In cases where, as in the lower extremity, a firm solid support, and not a movable joint, is desired, its value is at once evident; and perhaps in some excisions of the upper extremity, in which we require to remove a very large amount of bone. In ordi-

nary excisions of the upper extremity, we are more troubled with redundancy than with deficiency, and generally require to remove a considerable amount of bone to prevent ankylosis from occurring; but in truth, in a great many cases, the question is settled for us by the disorganised state of parts on which we operate.

There is one class of cases in which subperiosteal surgery seems likely to achieve some brilliant successes: I mean cases of acute necrosis, as they are called; in other words, cases in which inflammation of the dense shaft of a long bone has been so rapid, general, and violent, that nutritive changes seem arrested; and the bone separated, or nearly separated, from the investing periosteum, is exposed, with its surface bare, smooth, and white, as if dead. Although in such cases the constitutional disturbance, at first from irritative fever, and subsequently from hectic, always places the patient's life in great jeopardy, and though the tendency of the local action to spread to the epiphyses and involve neighbouring joints is very great, we have hitherto been content to wait patiently, often most anxiously, for nature to separate between the dead and living bone, before interfering. In cases where the state of the patient seemed to point to amputation as the only chance for life, the results have been so unsuccessful, that I think it scarcely warrantable. Now, however, by separating any remaining connection of the periosteum, and resecting and removing the diseased portion of the shaft, the long process of separation is avoided; the constitution is saved the tax on its powers from discharge, irritation, and hectic; the periosteum which is left furnishes new bone to take the place of that removed by the surgeon; and the limb gradually assumes its normal form and usefulness. Here, it would seem, we have clear advance in the treatment of disease; and I believe it is a real and great progress. Still we must look at it carefully from different points of view, so as to make sure of this, and avoid injury to the method from its being practised indiscriminately, or in improper cases, or during unfavourable conditions. We must remember that, in what we call acute necrosis, the loss of vitality seldom extends to the whole thickness of any great length of the bone; that, whilst the periosteal sources of nutrition may be largely or entirely cut off, the vascular supply and nutrition of the medullary canal and the ossific centres may not, and rarely are so to the same extent; and hence we can never be sure for some time how much of the affected bone may really perish, whether there may be a large portion to separate ultimately, or merely superficial exfoliations; or, as I have known, the whole surface of a long bone like the tibia may be exposed bare and white, and yet granulate and heal without a vestige of exfoliation occurring.

But, whilst I think it right that these things should be kept in mind, lest we interfere ultroneously and remove texture which natural processes would have saved, on the other hand, looking at the matter practically, when we see a patient suffering from hectic or occasional hæmorrhage from ulceration of vessels near the diseased bone, and when we consider how long he must be exposed to such sources of debility before the dead bone separates, and the risk of the implication of neighbouring joints occurring and necessitating amputation, I am shut up to the conclusion that resection and removal of the affected bone must be often indicated; and that, if the cases for its performance be judiciously selected, and the operation be properly effected, this method will be found to be a most valuable addition to our resources.

The important question, no doubt, arises, How far can we trust to the reproduction of new or substitute bone from the periosteum, when

the whole thickness and nearly the whole length of a long bone like the tibia has been removed by operation? And this question not unnaturally suggests itself, because we know from experience that under the expectant plan, when large and long sequestra were removed, the thickness of the shaft was never renewed to its full extent, although under that method we had both bone and periosteum to furnish new material. Here, for example, is a specimen, showing a large sequestrum removed when loosened by Nature, and a cast of the leg showing the appearance of the limb after the cure was completed. During last winter, Dr. MacDougall of Galashiels, now of Carlisle, exhibited a child to the Medico-Chirurgical Society of Edinburgh, in whom he had resected the tibia in a case of acute necrosis, and the thorough reproduction was well seen, and the use of the limb was perfect. In April last I operated on a similar case, and resected the shaft of the tibia close to the epiphysis at each end, after separating the periosteum. Here is the portion removed; and as the case is still in hospital, the members of the Association can judge of the probable result, so that I think we may trust to the periosteum for entire reproduction of the part removed.

To these and similar successful cases it may be objected that in cases of compound fractures, when the broken bone protruded, divested of periosteum, resection of the denuded bone was and is frequently practised; but experience has shown in such cases that, when the portion of bone so removed is large, reunion is almost never perfect; the ends of bone are atrophied and joined together by a tough fibrous material; or, in the case where there are two bones, as in the leg and forearm, the ends of the resected bone approximate and unite with the other bone. A little consideration, however, will show that there is really no parity between such cases and resection for acute necrosis, because in the case of compound fracture the periosteum is not merely separated, but is generally so torn and bruised that its vitality is destroyed, or so impaired that its reproductive powers are rendered very imperfect; whereas in necrosis its vascularity is increased, the membrane thick and flesh-like, and it almost invariably carries with it small nuclear portions of bone-tissue.

Passing to the consideration of the *Surgery of the Articulations*, a wide field opens before me, but I must limit myself to one or two points. In regard to excision of joints, now so firmly established as a conservative measure, and so obviously an advance in the right direction, I shall not enter on it here; but I cannot leave this department of operative surgery without directing attention to a method of excision of the condyloid end of the humerus in cases of ankylosis of the elbow resulting from injury, proposed by my distinguished hospital colleague Dr. Watson. It consists essentially in resecting and removing the condyloid end of the humerus without cutting the attachment of the triceps to the olecranon, or that of the brachialis anticus to the coronoid process—in fact, without removing any part of the articular surfaces of the ulna or radius. By this method the natural movements of the elbow are preserved, and the tendency to recurrence of the ankylosis is prevented. (Paper in *Edinburgh Medical Journal*, 1873.)

Dislocations.—The manual method of reducing dislocations of the hip has been revived and used with great success; so much so, that the reduction of these luxations, which formerly entailed much trouble and the expenditure of great force, can now be effected in recent cases as if by magic. I have said that the use of the rotatory or circumduction method has been revived: perhaps I should rather have said revived as a general practice, for, in truth, it has never really been altogether

abandoned. We generally hear it spoken of as the American method, and undoubtedly it is to the writings of Drs. Reid and Bigelow of the United States that we owe the more general use of the practice in this country; but it is not a little curious that it has been so little known or used, seeing that it is mentioned and described in some of the principal French works on surgery—not old black letter, but modern books, in the possession of most of us. Thus in Nélaton's *Pathologie Chirurgicale*, published in 1847-48, there is the following statement in reference to dislocations of the hip. "In 1835, M. Deprès made known a method which cannot be too highly recommended on account of its simplicity and the real services which it has rendered in certain difficult cases. . . . This method consists in flexing the leg on the thigh, the thigh on the pelvis, to exaggerate even the movement of flexion and adduction of the limb, then to exercise with it a gentle movement of rotation outwards, whilst at the same time it is abducted." This method, says Nélaton, is described by Pouteau in his *Mélanges de Chirurgie*. M. Chassaignac, in the second volume of his *Opérations Chirurgicales*, 1862, speaks of this method of reducing dislocations of the hip, and quotes the text of Pouteau as follows. "Surgeon-Major Maison Neuve, of the Regiment of Maugiron, a man of great merit, and trustworthy, assures me that he has reduced such luxations without the assistance of any extension. He first flexes the thigh at a right angle with the body; he then executes with the thigh a movement of rotation, which makes it approach the belly as nearly as possible, then carries it out towards the haunch, and returns it immediately by drawing it down towards the sound thigh." Pouteau adds that this method was known to the ancients, and that it is mentioned by Hippocrates and Paulus Egineta. The diagram to which I point is an enlarged copy of an illustration from a French work on Bandaging and Surgical Appliances, by Dr. Goffrés, published at Paris in 1859, and shows the surgeon in the act of using the manual method of Deprès. For this I am indebted to my friend Dr. Paterson, formerly of Bahia. M. Chassaignac enters very fully on the principle of the method; and there is a curious sort of coincidence in terms between his use of the letter Y, to assist his description, and the use made of the same letter by Dr. Bigelow, to mean a totally different thing. Dr. Bigelow speaks of the Y ligament as playing an important part in the rotatory method, describing the ilio-femoral ligament under that name, on account of the divergence of its fibres at their attachment to the femur. Chassaignac describes the leg and thigh, when bent, as representing a pair of compasses opened at a right angle, the lower or horizontal branch represented by the leg, the upper or perpendicular branch by the thigh—this latter divided at its upper extremity into two parts, like the letter Y, one part being fixed, represented by the ilio-femoral ligament, the other movable, represented by the head and neck of the femur; and then he proceeds to demonstrate how, by using the leg as the arm of a bent lever, whilst the ligament, being fixed, forms a pivot, the movable part—the head of the femur—is forced or directed to the acetabulum. Here we have an example of advance by the attention of the profession being directed to a method which had been practised from an early period, and which has never been altogether obsolete.

Bloodless Surgery.—It is in connection with operations for necrosis and the excisions of bones and joints that what is termed "Esmarch's bloodless method" of operating is seen to the greatest advantage, and these subjects suggest to me the consideration of that and other methods of "bloodless surgery". The bloodless methods may be divided into

two kinds; first, those that have for their object the prevention of loss of blood during the progress of operation; and, second, those by which the surgeon is enabled to divide textures by means of apparatus which, by the very mode of division, prevent the escape of blood at the time, and also act as permanent hæmostatics.

The method of Esmarch, though another example of a great improvement in carrying out a principle, can only be looked upon as a revival, not as new. The principle was clearly enunciated by the late Sir Charles Bell; and the mode of carrying it out by bandaging the limb from below, and then rapidly screwing tight the tourniquet, is described when discussing the value of the tourniquet in amputations, in his *Great Operations of Surgery*. But it is not in amputation that the method is most useful or seen to most advantage; and hence it had generally fallen into disuse. The method of Esmarch, by using the India-rubber roller to expel the blood from the part of the limb to be operated on, and the strong India-rubber tubing to constrict the limb and act as compressor, effects the object in view perfectly, and hence enables us to see the parts on which we operate as in a dissection, and prevents all loss of blood during the operation. It is a most valuable assistance to us in such operations as those for necrosis and resections of bones and excisions of joints. In many cases of removal of large sequestra, or resections of the shaft of a bone especially, we can, by stuffing the wound with oiled lint, and applying a compress and bandaging the limb before removing the circular compressor, render the operation absolutely bloodless. In excision of joints where we require to tie arteries after the operation, I prefer the tourniquet to the India-rubber as a circular compressor. It is equally effective in restraining bleeding; and, by loosening or tightening the screw, the vessels can be secured with less loss of blood than when the India-rubber is employed. Indeed, in many amputations, whilst the incisions are completed bloodlessly by Esmarch's method, the sudden and general oozing from the cut surfaces which follows relaxation of the India-rubber entails more loss of blood eventually than when the tourniquet alone is used. I have repeatedly amputated at the thigh and at the hip-joint, using only the tourniquet or manual compression, with the loss of not more than three or four ounces of blood; and in one case of primary amputation of the hip in the country by candlelight, in which I had the blood carefully collected from the tiled floor, as there seemed to be a large clot, I found, to my astonishment, that it barely amounted to half a teacupful. In many cases of amputation, owing to the septic state of the tissues, or the malignant nature of the disease for which we are operating, I consider it inadvisable to repress the blood and other fluids, such as unhealthy pus or cancer-juices, into the parts above. In such cases, I draw a band of India-rubber tubing, pressing on the limb from above downwards, and tighten it immediately above the part to be removed. This, of course, saves no blood to the patient; but it renders the operation bloodless in another sense, and is especially useful in private practice, as avoiding soiling of the floor or furniture. In cases of excisions of joints, where the parts are loaded with pus, I constrict above and below the point to be operated on, and thus secure a nearly bloodless operation without risk of repressing the unhealthy fluids into the textures higher up. I cannot see the advantage of the Esmarch method in such operations as ligature of the femoral artery. I have had frequent occasion to perform operations of that kind, and also of seeing them performed by others; but it is rare to see any bleeding; and I think it better that the artery and vein should be left in their natural

condition, that the operator may see and deal with them. An empty and collapsed vein would, I think, run greater risk of being injured than when seen full in its natural relation to the artery. I make these exceptions because I think that this form of bloodless surgery is liable to suffer from its indiscriminate use, and from over-laudation; but I have already said that I consider it a most valuable aid in proper cases, and it seems as if it were revived now with special relation to the progress of conservative surgery.

The bloodless surgery comprised under the second head consists, as I indicated, in division of parts by means of the various apparatus which prevent bleeding during the process, and permanently. It includes cauterising agents, whether red-hot knives or galvano-cauteries, and crushing divisors, such as the different kinds of *écraseurs*. In regard to the use of the cautery to stop hæmorrhage, I need hardly say we cannot claim that as new, or as a discovery of the present time. Indeed, I referred to this as one cause that might lead an observer to suppose that we were revolving back to primitive surgery. Before the general use of the ligature, no small ingenuity was used to invent instruments which would sear and arrest bleeding as they cut the textures; and some surgeons, when they ventured to cut through living textures, used the summary method of applying hot pitch or tar over the face of the stump to arrest the bleeding. I am old enough to recollect seeing the result of an amputation of the thigh which had been thus treated. The man had been injured on board a whaling vessel; and, for lack of other aid, the ship's carpenter amputated. Whether from his acquaintance with ancient surgical authorities, or simply acting on the rules of his craft, he "paid" the stump with hot pitch. The man recovered well, possibly owing to the antiseptic action of the pitch, and subsequently eked out his means of living by exhibiting himself at the surgical classes as an "Ancient Mariner" and a connecting link with antique surgery. Although heated knives are again being used, I cannot and I do not think the profession will hail their revival as a mark of progress in surgery. But, in regard to the use of the galvano-cautery for the purpose of dividing very vascular textures, or for removing tumours in situations where we cannot reach and tie divided vessels, or where there is danger from the blood entering the air-passages during an operation, as in some operations on the mouth, I think there can be but one opinion of the value of such means, and also that modern surgery has made advances, and I trust is destined to make farther advances in this direction. The chief difficulties to be overcome are in the cumbrous nature of the apparatus and the difficulty of getting a galvanic power in moderate compass to heat a platinum wire of sufficient thickness. In the surgical manipulations, habit of using the wire requires to be attained to keep it in constant and close contact with the tissue to be divided, because, at any point where the wire does not touch and give off its heat to the tissue, it fuses and gives way under the action of the electric current. Those of us who have been accustomed to use the knife will find it advantageous to acquire the mode of manipulation necessary for proper use of the wire. From the very few opportunities I have had of seeing or using the galvano-cautery, I am hardly warranted in expressing an opinion; but I think we require to modify the heat so as to divide the parts more slowly, because a large vessel cut across rapidly by a wire at a white heat will bleed at once as if cut by a knife. The *écraseur* is another means by which bloodless severance of textures can be effected, and it has even been employed for the amputation of limbs. Its real

value, like that of the galvano-cautery, lies in its application to operations where the parts to be divided are so situated that we cannot tie the vessels or command bleeding during section of the parts. Its utility in such cases, more especially in operations on the uterus and tongue, has been longer and more largely tested than galvanic cauterisation, and, as compared with our present means of applying the last-named method, it is more simple and more easily managed; but it seems to me that, from the nature of the wound left after the use of the *éraseur*, it is more liable to unhealthy action than that resulting from the cautery; and, if that method could be rendered more manageable, I believe it would gradually supersede the *éraseur*. Meanwhile, however, the *éraseur* is an instrument of great value for the class of cases to which I have alluded, and forms another addition to the resources of our art.

Closely allied to the galvano-cautery—a modification of it, in fact—is galvano-puncture or electrolysis. This agency has been used in the treatment of aneurisms beyond the reach of ordinary surgical operations; and, although from the nature of these cases it has not effected any positive cures, it has, in the hands of my hospital colleague Dr. John Duncan, and others, delayed a fatal issue in cases where external hæmorrhage was threatened, and shown its power as producing coagulation of the blood in the sac.*

It is, however, to the uses of galvano-puncture or electrolysis in certain forms of vascular erectile tumours that I wish more especially to direct your attention, as a most valuable addition to our means of treating these often formidable growths. I do not speak of it as a general method, you will observe; for there are many forms of *nævi* and erectile tumours, in truth a majority of that class of diseases, in which other methods are more rapidly effective.

Galvano-puncture is specially indicated in those cases in which the erectile tumour is deep-seated and covered by healthy undiscoloured skin. Until a few years ago, our interference in such cases was limited to dissecting off and reflecting the superimposed textures, so as to expose the tumour without touching it with the knife, and then strangulating it by strong ligatures, and, when the growth had sloughed and separated, replacing the flaps of skin; or by ligature of large arterial trunks indirectly connected with the growth, as, for example, ligature of the carotid artery for orbital erectile growths. The former method was attended with grave inconveniences and dangers, and the latter, besides entailing risk, was most uncertain in its effects, as you can readily understand from the nature of the disease. More recently, injections with the perchloride of iron took the place of these methods, and, in a great number of cases, answered very well, but in others a very considerable amount of sloughing took place before the rest of the tumour had been consolidated, and in such cases severe hæmorrhage occurred, and the life of the patient was endangered. In some cases also the injections of perchloride were attended with a rapidly fatal issue, apparently from thrombosis. I must, however, say that I never saw such a result, though I have long used and continue to use the perchloride of iron injections, and I can only attribute such accidents to the neglect of tearing up the texture of the tumour before injecting the perchloride.

Contrast of the results of different methods is perhaps the most effectual way of impressing their comparative advantages, and shows what advance our science in making; let me, therefore, bring under your

* I find that Dr. Duncan has had successful results in large cirroid aneurisms.

notice the following cases from my own practice. An infant, six weeks old, was sent to my care on account of a deep-seated pulsating erectile tumour, occupying the palm of the hand, and extending up the wrist. The tumour had been growing rapidly, and at one point the skin was thin and discoloured. I used injection of perchloride of iron, and part consolidated. Again, it was used, and the consolidation was followed by inflammation and the separation of a small central slough. From the ulcerated surface bleeding took place, and, though arrested by local application of the perchloride, it returned from time to time; and as the child's life was thus endangered, and the growth seemed rather to increase than diminish, I was forced to amputate in the forearm, when the infant was eight weeks old. She made a very rapid recovery, but with the loss of a hand. I show you here the cast of the hand of an infant affected with deep-seated pulsating erectile tumour very similar to the former. In this case I applied electrolysis during three months, while the child was under my care in hospital, and by several applications of the battery the growth began to consolidate and contract, whilst, except at the time of an application, the child suffered no irritation. As it was inconvenient for the mother to remain in hospital, I asked Dr. Connel, of Peebles, who had sent the case to me, to conduct the remainder of the treatment. As the child's parents lived at some distance from Peebles, the applications of electrolysis could only be made at long and irregular intervals. Here is a cast of the hand when the cure was completed; and, when you contrast it with this preparation of the amputated hand of my former case, you will, I think, agree with me that the result is a triumphant vindication of the value of electrolysis in such cases. I have used it also in other cases with advantage, especially in an enormous erectile nævus of the face of a girl. It is of importance that it should not be applied indiscriminately to all cases of nævus or erectile tumours. I think its use should be restricted to cases where the erectile growth is covered to some depth by healthy skin. The needles are coated to a certain length with a nonconducting material, which protects the healthy superimposed texture, whilst the uncovered points passed into the growth act on it at different parts. If needles be applied to a superficial erectile spot, they cauterise and leave more mark than other methods, such as application of nitric acid, perchloride of iron, or iodine. Thus, in treating the large erectile nævus of the face, the electrolysis was only used to the deep-seated portions, while the superficial discoloured marks were treated by applications of perchloride, iodine, etc.

These references to bloodless methods of treating surgical cases remind me that for some time back the medical profession has been trying like Lady Macbeth to wash its hand from all stain of blood. "*Ecclesia abhorret e sanguine*" was the decree of the Council of Tours, with how much truth let history say. "*Medicina abhorret e sanguine*" is apparently the watchword of expectant medicine; and so, except in the hands of a few hardened heterodox individuals, venesection has become almost obsolete. What has led to this great change? May I put the question to the seniors present, What led you to abandon general depletion? Was it from the dire effects you had seen of its use? Was it change of type in disease? Or could it be change of fashion?

It has, I know, been fashionable for some time to decry the practice of general blood-letting, and hence any views to the contrary will probably be considered very heterodox. I do not feel inclined, however, to withhold an opinion which my own experience in the past satisfies me is practically correct. The opponents to general depletion denounce

the practice as being unscientific, and urge that it is so (1), because it is not in accordance with pathology, and (2) because it diminishes the vital powers of the patient, and thus interferes with Nature's efforts to overcome disease and restore healthy action. They ask us: "Can depletion remove the inflammatory infiltration which has taken place, and which constitutes the most formidable part of the diseased action?" Most decidedly not—and no one would suppose for a moment that it could do so directly; but, by relieving the preceding phenomena of exciting action and congestion, it will tend to prevent further infiltration, organic change, and functional disorder, and thus leave less mischief to repair. I hold that general depletion is quite in accordance with the pathology of inflammation, so long as we view that action in its progress as a whole, and do not limit our ideas to one part or one result of the action. The second objection is in great part pure assertion, and what grain of truth there is in it is drawn from an experience in treating a class of patients whose previous health or habits, or both, render them unfit to bear even moderate depletion, or patients who have been admitted into the hospital when the inflammation (say pneumonia) was far advanced and extensive. Surely, the employment of venesection in improper cases is no good argument against its judicious use. As to the exaggerated pictures sometimes drawn of the slow and imperfect recoveries, the permanent debility, and the wasted and anæmic forms of the victims of blood-letting, I can only in charity suppose that they are sketched by those who have had no opportunity of seeing the practice they condemn, and who, therefore, draw largely on their imaginations to describe what they suppose should be the results. Although I have seen a good deal of the use, and also, I have no hesitation in saying, the abuse of the lancet, when venesection was practised indiscriminately, and when it was customary for people to be bled periodically as a preventive to disease, I cannot recall any of these fearful results; but I can remember many a case where relief from suffering was afforded and cure of acute disease effected by the prompt and judicious use of blood-letting. It should not be forgotten that the continuance of the intensely febrile state, which is symptomatic of the local inflammation, is a far greater source of exhaustion of the vital powers than the timely abstraction of a few ounces of blood.

From the subject of bloodless surgery, I might very naturally pass to the subject of arterial lesions and aneurisms, and their treatment in the present day as compared with the past. The subject is undoubtedly inviting, and one of the most important in surgery; but there are two reasons why I think it advisable merely to touch on it: first, because there has been so much attention directed to it of late by special series of lectures; and secondly, it is one of my "hobbies", and that kind of equitation does not answer when time is limited. I may, however, briefly state that, though I have successfully employed both flexion and compression in the treatment of true aneurism, and although, as I have pointed out elsewhere, I hold these methods generally advisable in the early stage of aneurism, considered even as a preparation for ligature, and as in many cases effecting a cure, I do not believe either of them will take the place of ligature. The vessels in which it would be most desirable to avoid deligation, viz., the great arteries at the root of the neck, are just those in which efficient compression is not easily secured, and flexion is out of the question; whilst in the arteries of the extremities, my own experience has not impressed me with any great risk if the operation for ligature be carefully performed.

There is one form of aneurism, to the treatment of which I drew attention some years ago.

Traumatic Varicose Aneurism of the Femoral Artery.—In all the cases which I could collate, and they were few, I found the results had been anything but satisfactory. In cases where the direct method had been adopted of opening the sac and tying the artery above and below the wounded point, the inevitable interference with the wounded femoral vein led to its obstruction, and gangrene followed; whilst in cases where the femoral had been tied on the Hunterian method, the operation failed to effect a cure. In the case which led me to consider the subject, I first tried compression and flexion for some time, but without the slightest advantage, and then I decided to tie the femoral above and below the false sac without interfering with or opening the sac, thus avoiding all interference with the wounded vein, and at the same time preventing retrograde circulation into the sac; and I carried my plan into execution successfully. I see that Mr. Holmes, in his lectures before the College of Surgeons of England, whilst he considers my method the best if operation is to be performed, speaks hopefully of compression as likely to obviate the necessity for operation. But, in the case which I published, compression and flexion combined were carefully and persistently carried out for some time without the slightest effect; and when we consider the communication between the false sac and the artery and vein, and consequently the want of limitation to favour coagulation, I cannot speak so hopefully of compression proving successful. If Mr. Holmes considers the operation I adopted somewhat difficult in execution, what would he say to the latest method of treatment published, where the surgeon, after tying the femoral in Scarpa's triangle without effect, cut out bodily the false sac and the vessels communicating with it as a last resource!

Tumours.—The subject of tumours in the present day has two aspects: a pathological one, purely scientific; the other a clinical or practical one. Doubtless a time will come when the labours of pure pathologists in investigating the anatomical structure of tumours will have more evident relation to practice than now; for as yet the bearings of pathological research, and the various classification of tumours founded on it in regard to practice, are not marked. It is evident, I think, that, for the practical surgeon, any classification which does not proceed upon a study of the clinical or vital manifestations of the growth in its origin or during its progress can be of little service. However valuable a knowledge of the structure of the growth may be, that can only be ascertained after its removal; whereas the surgeon is naturally desirous of facts and observations which will guide him in the diagnosis and treatment of the tumour whilst it still forms a part of the organism. The attempts which have been made to apply the knowledge of the structure of tumours to diagnosis, by examination of small portions of their solid or fluid constituents removed prior to operation, are very imperfect, and might often mislead. It has happened to me in several instances that nothing has been found but blood-discs entire or broken down, or a little granular or amorphous matter, when the structure of the tumour after removal exhibited most marked characters of malignancy; so that practically I have little faith in such explorations as an aid to diagnosis. On the other hand, experience derived from the study of the vital manifestations and tendencies which characterise growths as divided into the "simple and malignant", enables the surgeon from experience to judge of the propriety of interfering or abstaining from operation in certain cases. Thus, if, from the history

and examination of the case, he satisfies himself that the growth belongs to the simple class, he knows that, from the limitation of such tumours, he can be sure of effecting its complete removal, although its anatomical relations may be intricate and important; whilst, from the absence of constitutional cachexia, the prognosis of the result is favourable. Until a comparatively recent period, it used to be laid down as an axiom, that removal of tumours of the neck situated under the sterno-mastoid muscle should not be attempted; and we were directed to the failure in result when such attempts had been made; complete removal of the growths having been found impossible, and their rapid reproduction being the consequence. In a case of an enormous deep-seated tumour of the neck which was sent to my care from Lancashire twelve years ago, the objections to which I have alluded were pressed against interference by the late Professor Syme, and I was referred to cases in which John Bell and Mr. Liston had been forced to leave portions of the tumours owing to their connections; but I had examined into these cases, and felt no doubt, from their history, that they were both of malignant character, and the fact, that even in these cases the tumours were all but removed, I pointed out as an encouragement for operation where the tumour was of simple character, and therefore limited in its deep relations; and, relying on the character of the tumour, I decided to remove it, and did so successfully. I suppose no surgeon would now hesitate to operate in such cases; but interference with deep-seated malignant tumours is a very different matter, and, I think, should be avoided. There is another feature in the characteristics of tumours in which I have great faith; viz., that a growth originally of simple character, as evidenced by its originally slow development, consistence, etc., however much it may at a later stage degenerate locally and manifest many of the symptoms of malignancy, never does become truly malignant, constituting a diathesis, so to speak, as in cancer or encephaloid growths; and that, therefore, we may remove such tumours with every prospect of success under circumstances where it would be unwarrantable to interfere were the growth truly malignant. In this huge osteo-fibroma of the bones of the forearm which I removed nearly thirty years ago, you have an instance of what I state. It had at first grown slowly, and without bad effect on the health; but latterly, from the pressure caused by its bulk and consistence, the soft parts had ulcerated; local applications had increased irritation, until at last it assumed a fungating surface, wasting the patient by the pain and discharge. When I saw her, she was considered a hopeless case. She was pale; the skin was of a yellowish tinge; and she was so anæmic, that she appeared cachectic; and there were enlarged glands in the axilla and above the clavicle. But, trusting to the original character of the growth, I amputated the arm at once, and in less than three weeks she was able to be out; all bad symptoms disappeared, and for many years she continued to enjoy the most perfect health, and, so far as I know, is still alive and well. I point to these cases as examples of the value to the surgeon of the classification of tumours founded on the study of their clinical history and vital manifestations; but at the same time I am far from undervaluing the study of the structural anatomy and development of tumours in its proper place.

It must be allowed that the introduction of anæsthetics has given facilities for surgeons performing operations for the removal of tumours which could hardly have been attempted formerly without great risk, owing to the movements of the patient. My colleague Dr. Watson has now on several occasions excised the entire thyroid body successfully,

an operation the feasibility of which had often been discussed formerly, but never accomplished until the present time, so far as I am aware. The success which now attends the performance of ovariectomy is, I believe, also greatly due to the leisurely and careful manner in which the steps of the operation can be accomplished, together with the advances which have been made in the accuracy of ovarian diagnosis. The success which has attended the operations of modern ovariectomists must excite admiration and congratulation on the relief afforded to suffering; but, when we contrast the advantages under which the operation is now performed with the conditions under which it was first performed in this city by John Lizars, we must be struck with the self-reliance and undaunted courage with which that bold surgeon carried out what was then a very formidable operation, in the face of opposition from the principal medical authorities of the time; and I think too little credit has been given him in regard to the work he did and the success he obtained under great disadvantages.

Air-Passages.—In the important department of the injuries and diseases of the air-passages, great advances have been made both in regard to diagnosis and to treatment. The use of the laryngoscope in cases of chronic or subacute disease of the larynx, and for enabling us to ascertain how far the symptoms depend on organic changes, or merely on paralysis or spasm affecting the vocal cords from diseased innervation, or for discovering the position of small foreign bodies entangled in the larynx, or of intralaryngeal growths, is an invaluable accession to diagnosis, and in determining the question of operation and plan of procedure in different circumstances.

The operation of tracheotomy has also been extended to a class of cases in which it was formerly considered unsuitable; and new operations, such as the partial or even complete excision of the larynx, have been successfully performed; and in one case by Professor Billroth, an artificial substitute was adopted, which enabled the patient to speak and read intelligibly.

Having had a very considerable experience in operations on the air-passages for injury or disease, I desire briefly to draw attention to some practical points. First, as regards injuries. There are some conditions not sufficiently insisted on in surgical works as to their dangers, or the practice to be adopted, where action requires to be prompt. Thus the danger from emphysema of the loose connective tissue of the neck is seldom adverted to; and yet I have seen a patient all but suffocated from this cause from a small oblique wound of the larynx inflicted with a penknife. In that case, I had to perform laryngotomy, and was obliged to make numerous incisions to afford relief; when a simple enlargement of the wound, in the first instance, would have allowed the air to escape externally. Again, in tracheotomy for removal of foreign bodies, it is generally considered unnecessary to use a tube after the foreign body has been expelled, but merely to allow the incision to close at once. The consequence is that a good deal of trouble often results, for the wounds in the trachea and the superimposed parts do not correspond, and air and mucus escape into the cellular tissue, sometimes giving rise to considerable emphysematous swelling of the neck, and often leading to deep-seated irritation of the wound. In my own operations after removal of foreign bodies, I insert a tracheotomy tube, and retain it until the surface of the wound is glazed by the effusion of lymph; and then approximate the margins of the wound by strips of plaster, so as to avoid all risk of confinement of air or mucus in the tissues in the vicinity of the trachea. Another

point of importance is the question of exhibiting anæsthetics in operations for removal of foreign bodies. Many years ago, I drew attention to this, and pointed out that when the foreign body was loose in the trachea or bronchus, the exhibition of anæsthetics interfered with the force of the expulsive powers which usually eject the foreign substance; and, as happened in one of my own cases, the foreign body may be carried back by the incoming current of air, occlude the bronchus, and cause collapse of the corresponding lung. In other cases, as when the body is impacted in the bronchus or larynx, anæsthetics are most useful in enabling us to search for and remove the foreign substance. In doubtful cases, the rule should be to open the trachea without using anæsthetics; and, if the foreign body be not expelled by the natural forces, then to administer chloroform to enable us to deal with it effectually. When, as in the case I have alluded to, a foreign body, such as a plum-stone, is impacted, and fairly occludes the bronchus, being carried before the inspired air, it follows that, the lung beyond being collapsed, there is no force behind to eject the substance. In such circumstances, it is well to avoid trying too much to displace it by means of bent probes or other instruments, unless the end of the instrument can be passed over and beyond the body, so as to tilt it out or allow air to pass to the lung beyond. Our continued efforts, besides exciting local irritability, are very likely to impact it more thoroughly; and I would therefore counsel the surgeon to abstain from useless efforts, and allow the patient to breathe by the sound lung, and wait the loosening of the foreign body by vital dilatation caused by its presence, when air will gradually pass beyond and expel it.

In hollow or tubular foreign bodies, the case is different; they can be easily removed if we take the proper method—one which I practised some thirteen years ago, in a case where this trachea-tube had slipped down and became impacted in the left bronchus. Instead of trying to open the forceps and seize the edges of the tube, I passed the forceps closed into the tube, and then, on expanding the blades and maintaining them expanded, the foreign body was withdrawn with the utmost facility.

The propriety of tracheotomy in cases of threatened asphyxia from œdema glottidis, arising from swallowing boiling fluid or inhaling the steam of boiling water, would seem so evident as affording the only chance for life, that we would scarcely expect any difference of opinion; and yet I find it is by some considered unwarrantable, because the average results of such cases show few recoveries. Now, in the first place, I doubt if we have statistics so extensive or accurate as to warrant such a conclusion; but allowing that the recoveries are few, we see that the want of success is mainly due to the fact that these injuries implicate other structures, such as the pharynx or œsophagus, or are complicated with the shock and other conditions of general scald. If, however, in such injuries, œdema of the parts about the glottis threaten asphyxia, it is evident that the patient has no chance of life, except by the operation; whilst no one will venture to deny that tracheotomy has, in many such cases, rescued the patient from impending death.

The value of tracheotomy in the acute and chronic affections of the larynx in adults, whether to afford relief from suffocative paroxysms or as a precautionary measure, is now so generally admitted that I need not occupy your time with that; but I desire to draw attention to two classes of cases in which this operation is sometimes performed, as affording temporary relief from suffocative paroxysms or impeded respiration. I mean (1) cases of aneurism or tumours pressing upon the

laryngeal nerves, and causing spasm of the glottis ; and (2) aneurismal tumours of the aorta or innominata impeding respiration by direct pressure on the trachea at the root of the neck. In the former class of cases, I consider that the operation is not only warrantable, but advisable, or even imperative, because it gives relief from impending suffocation, and also alleviates conditions which tend to increase the aneurism, or even to hasten its rupture ; so that tracheotomy prolongs life with comfort to the patient. In the second class of cases (aneurismal tumours at the root of the neck, pressing directly on the trachea), I cannot see the principle on which the operation is recommended. In such cases, the tumour is lower down than where we can open the trachea ; and if we use a tube long enough to pass beyond the aneurism, we are in great risk of rupturing the sac, which generally, in such cases, presses upon, and causes absorption of, the tracheal fibro-cartilages, and projects the mucous membrane. Indeed, as pathological specimens shew, the tracheal textures become incorporated, as it were, with the sac, and the aneurism generally thins and tends to ulcerate towards the trachea. Hence I cannot see how an opening in the trachea on the distal side of the impediment can relieve the breathing, whilst there is very evident risk of killing the patient by wounding the projecting and attenuated sac in opening the trachea, or rupturing it in trying to pass the trachea-tube beyond it. Here is a preparation from a case in which I made a very narrow escape from being involved in a most unpleasant predicament. I was asked to see a lady who had long suffered from bronchitis and asthmatic attacks, and in whom laryngeal symptoms seemed to indicate commencing œdema glottidis. As the medical gentleman informed me that the late Dr. Begbie had been seeing the patient, and as I understood that the laryngeal symptoms were not very urgent, I suggested that Dr. Begbie should be first asked to see the patient ; and if he considered tracheotomy advisable, I would come and operate. I heard nothing farther until, meeting the medical attendant a day or two afterwards, I inquired about the case, and was informed that, after Dr. Begbie had examined the patient generally, he proceeded to examine the throat and mouth by gently depressing the tongue ; this caused retching, followed by a fearful gush of arterial blood, which proved instantaneously fatal. If I had operated, the insertion of the tube could scarcely have failed to have ruptured the sac, and I leave you to conceive the situation. I think I have said enough to show that I am decidedly opposed to operation in cases of this latter class. But should anyone be inclined to operate, I would advise the use of a large-sized, bulbous-pointed, soft gum catheter, with an enlarged opening, to pass beyond the tumour, instead of the metallic tube.

Although from an early period tracheotomy was occasionally resorted to in croup in children, it is only of comparatively recent date that it has been recognised as a warrantable operation in such cases. In this city and in Leith croupous affections used to be very common, and yet the operation of tracheotomy was so rare that I never saw it performed for croup when I was a student ; indeed, so great was the prejudice against it, that I have been informed that in 1820 a medical gentleman of high standing in this city, who was anxious to afford a chance of relief to two of his children affected by croup, could not prevail on any of the principal surgeons to perform tracheotomy. At his urgent request, Dr. Bryce, a gentleman in general practice, operated on one of the children, without ultimate success, as both the children died. This strong prejudice against operations in croup arose, I think, from somewhat erroneous views regarding its pathology. In *post mortem*

examinations, the false membranes extending from the larynx into the trachea and bronchi, and often found in the form of complete tubular casts—a condition so different from the laryngitis of adults—led to the idea that the trachea was affected in the first instance, or at least simultaneously with the larynx, and the disease was named “*cynanche trachealis*”, in contradistinction to laryngitis. Hence most physicians and surgeons considered it improper to operate when the disease, as they thought, was situated at and beyond the part where the aperture in the trachea could be effected. From what I have noticed of the progressive symptoms of croup, and seen of the state of the diseased parts in cases when children died in the early stage, and especially from the immediate relief from impending suffocation afforded by tracheotomy even in cases which subsequently proved fatal by extension of the false membrane, I feel satisfied that the disease always commences in the larynx, and only extends downwards as it progresses; and hence I dismiss the objection that the disease is from the first situated too low down for tracheotomy to afford relief. The principal objection to operating in croup is undoubtedly the tendency of the disease to spread downwards after the operation. We owe it to our continental brethren, especially to Trousseau, that tracheotomy in croup has now become an established operation. I must confess that from early teaching I was strongly prejudiced against the practice; but, fortunately for me, it happened that a child was brought to me in the agonies of suffocation, so that I could not but try to relieve it. The relief was immediate and the result successful, and thus I could not deny the like chance to others. I have now performed tracheotomy for simple croup and diphtheritic croup one hundred and three times, and saved thirty-four out of that number, or an average of about one life saved in three cases; and it must be remembered that at first I only operated as a last resort, and even yet I do not see my way to operate quite so early as some French surgeons seem to do. I think, however, that there should be no delay when the character of the breathing and the contracted state of the thoracic parietes show that the lungs are not being distended with air. By operating early, we avoid the risk of œdema or congestion of the lungs, and of the effects of non-oxygenised blood circulating in the brain.

I think it right, however, to warn my younger brethren that it will require some effort to bear up against discouraging results. I know of no class of cases in which the experience is so painful: an average gives little idea of it. You may have five or six cases in succession, all proving fatal, before you meet with one redeeming success; but then you have the temporary relief almost invariably afforded to the little sufferer; the resuscitations in some cases apparently dead; and, if you persevere, the average of success will come. Above all, we must recollect that, however disagreeable or unpleasant the operation may be to ourselves, we are bound to lose sight of that, and give the patient the only chance for life.

In speaking of operations in croup, I have used the terms simple and diphtheritic croup; and I have done so advisedly, because, whilst the average results of my operations have been as good in the one disease as in the other, I consider them as essentially different diseases, and I do not believe that an extended experience would give the same amount of success in diphtheritic as in simple croup. It has been with no small amazement I have read some of the views recently propagated, that croup and diphtheritic croup are identical. I can hardly conceive two diseases more different, whether we consider them in their causation,

symptoms, or sequelæ. In one feature, doubtless, there is similarity, because when in diphtheria the air-passages become affected, the presence of the membrane exuded necessarily gives rise to the same physical symptoms as to sound of voice, breathing, and asphyxiating paroxysms, as the false membrane in simple croup does. But in diphtheria, the exudations in the larynx or elsewhere are the local expression of a special blood-disease, which may and often does destroy life without affecting the air-passages at all, whereas in simple croup the false membrane is the result of a local inflammation. The causes or circumstances in which the two diseases originate are, according to my experience, very different. Ordinary croup almost invariably arises from exposure to cold, or occasionally from some source of local irritation, leading directly to inflammation of the mouth, as dentition. It is most frequent during cold moist weather, and specially during the prevalence of easterly or north-easterly winds. The late Professor Alison used to say that, according to his observation amongst the poorer classes, the affection most frequently occurred between Saturday night and Monday morning; and he attributed this to the custom of washing the floors of the rooms on the Saturday night after the children were in bed. Diphtheria, on the other hand, prevails at all seasons and during all kinds of weather—sometimes as an epidemic, and then generally coincident with scarlet fever, but always more or less connected with, or influenced by, the effects of sewage-emanations or imperfect drainage. Hence we meet with it more frequently amongst the better classes and in houses with modern accommodations, such as fixed wash-basins and water-closet accommodation in immediate connection with nurseries or bedrooms.

Diphtheria is undoubtedly infectious both by direct contact of the sputa with a healthy mucous surface, as has been too often proved by members of our profession and by mothers, or by emanations from the affected person, as evidenced by the manner in which it spreads in a family. Simple croup, as I have been accustomed to see it, has no such contagious or infectious character. In dispensary practice, I have frequently seen a child affected with croup lying in a confined room amongst other children; but I never knew the disease to spread as diphtheria does. The peculiar nervous affection, the paralysis which follows diphtheria, has no counterpart in ordinary croup; nor, in cases of simple croup, were we accustomed to see the white leathery pellule on the tonsils or fauces, though it was a very common disease in Edinburgh and its vicinity. I know that in France the fauces were always examined, and that false membranes or pellicle were considered symptomatic of croup; but that only leads me to believe that the disease in France was always of a different type—diphtheritic, in fact.

Certainly, in this country, croup, as we used to meet with it, is rarer, whilst diphtheritic croup is more frequent, and met with under different circumstances. From 1828 until about twenty-five years later, diphtheria seemed to have ceased, though simple croup was common; but, when nearly a generation had passed away, the disease was unhesitatingly recognised by some who had seen the previous epidemic; and I would refer you to the interesting paper on Diphtheria and its sequelæ by the late Dr. Begbie, in his work entitled *Contributions to Practical Medicine*, in corroboration of what I say. Considering the two diseases from a surgical point of view, even in successful cases, the constitutional conditions are marked in diphtheria by paralytic complications affecting the pharynx and larynx, by albuminuria and the asthenic state of the patient, and by the tendency of the wound to take on the

diphtheritic action. But it is in the fatal cases that I think the distinction between the two forms of disease is most marked by the mode of death. In a case of simple croup, the result is decided within two or three days ; indeed, generally in a shorter period, by the false membrane extending beyond the opening and tube. In diphtheria, I have on many occasions lost patients eighteen days or three weeks after the operation, and when the tube had been removed for some time, from asthenia and gradual failure of vital powers, or from paralysis of the pharynx, preventing swallowing, and so leading to imperfect nutrition ; and, in other cases, I have known it prove fatal from sudden failure of the heart's action and syncope.

I drew attention to these differences many years ago in a paper read before the Edinburgh Medico-Chirurgical Society, and subsequently published ; and, looking back on a large experience in croup and diphtheritic croup, I think the distinctive characters are too marked to allow me to consider the diseases as identical, merely because they possess one feature in common.

The bold operation for complete removal of the larynx for malignant disease, successfully carried out by Professor Billroth, and the adaptation of an artificial substitute, so ingeniously constructed as to enable the patient to read and speak, has not, so far as I am aware, been yet practised in this country, though I understand other successful results have been obtained on the Continent. Looking at what has been done, may we not anticipate a time when operative skill and mechanical ingenuity proceeding *pari passu* may reduce the dangers of the operation to a minimum, and advance the powers of the artificial substitute to the maximum ; and so enable an unfortunate ungifted with the power of song to get rid of his unmusical larynx, and suit himself with one, à la Mario or Lablache, according to his taste ?

Treatment of Wounds and Surgical Dressings.—I could not properly conclude an address on Surgery in the present day, without some remarks on a subject which is attracting so much attention as the treatment of wounds and surgical dressings. The history of surgery contains no stranger chapter than the singular changes which from time to time have taken place in regard to the treatment of wounds. If we go back to the quasi-scientific age, when learned physicians laid down rules for dressing wounds *more canonico*, we find it was considered essential that every wound should undergo certain regular stages, “digestion, mundification, and incarnation”, and no wound was allowed to heal by first intention. After amputation by the circular method, the cavity of the stump was stuffed with charpie soaked in aromatic spirits, or balsamic lotions, to prevent putrescence ; and, in flap amputations, the section of the limb and the flap were dressed separately until granulation took place. Into every deep wound tents or leaden tubes were thrust, to keep open a track for discharge to escape. We are at first apt to wonder how or on what principle such treatment could have been adopted, and how, in only a somewhat modified form, it continued to hold its place until the time of Hunter, and, in some places, until a much more recent period. Yet its first beginnings were probably the result of observation of certain cases or forms of wound, and used exceptionally until, in course of time, from mere routine practice it became exaggerated and used in all cases.

Most practical surgeons will admit that, in wounds implicating textures possessing different degrees of vitality and physical conformation, as in amputations, it can hardly be expected that all the divided structures should heal with equal rapidity, or in the same way. Whilst

the skin and softer textures generally do so speedily, the denser and less vitalised textures, such as bone and tendon, must undergo changes of slower character; and, situated as these are deeply in the wound, serous and bloody discharges are liable to collect around them, and, when the soft textures have united throughout by first intention, these bloody or serous discharges, being prevented from escaping, may, and often do, lead to deep-seated irritation and suppuration, and hence the revived use of drainage-tubing in many cases in the present day. Such considerations probably at first led to the use of tents and the other parts of the system; and the amount of discharge arising from the method of dressing seems only to have served as an argument for the necessity of keeping the wounds open to allow its escape. Then we must recollect that at that time surgeons acted merely as hands to the learned doctors, and to have ventured to have gone against the canonical authority was to be branded as a quack; and so the men who saw most of the dressing of wounds either kept silent, or became the itinerant operators to whom we owe no small debt for the simplification of dressing wounds and of operations.

Even when the simple method of healing wounds was introduced, it was seldom professed openly. It was always ornamented with a judicious touch of the mysterious or philosophical as it was called. Perhaps no truer enunciation of the principles of the treatment of wounds has ever been made than that of Paracelsus, who was one of those who ventured to oppose the orthodox physicians. "It is the nature of flesh," says he, "to possess in itself an innate balsam which heals the wound. . . . Nature hath her own doctor in every limb; wherefore every chirurgeon should know that it is not he, but nature who heals. What do wounds need? Nothing. . . . So the surgery of wounds is a mere defensive to prevent nature suffering from any accident from without, in order that she may proceed unchecked in her operations." Yet Paracelsus thought it necessary to invent a sympathetic powder to recommend this method to the public. Mr. John Bell, in his remarks on wounds, says, "We find no one surgeon in Europe who ventured to unite wounds directly by adhesion, without pretending to have learned from some eastern sage, or to have found out by deep studies in philosophy and alchemy, a sympathetic, or as they often called it, a philosophical cure of wounds," and he is very severe on what he denounces as pretences of philosophy or science "To make sure of rousing at least one-half of the learned world to combat in their behalf." Perhaps he is too severe in denying them the title of philosophical. If "The proper study of mankind is man," then assuredly on that important study these men had founded their philosophy. They had noticed that patients in general feel rather flattered by something special being done, some little halo of mystery to brighten their sufferings, and give importance. They saw that for one "Good Hezekiah" who meekly submits to so simple an application as a "poultice of figs", they would meet with a dozen Naamans "ready to turn away in rage" if there were not "some great thing" done, or some fuss made about their cases; and so, whilst they treated the wounds simply or left them to nature, they amused and distracted the attention of their patient by enacting various little incantation scenes or mysteries. Some, like Paracelsus and Coldbatch, applied their sympathetics locally to the wound in the forms of vapour, powder, or constrictive plasters. Others still of higher philosophical type, like Sir Kenelm Digby, did not trouble themselves to see the patient, but merely some blood-stained rag from the wound, or the weapon that inflicted it. On these they

bestowed all their care and attention, merely requiring that the patient should keep his wound "clean and cool". They had their failures like others, but their philosophical theory enabled them to account for them. Something had been overlooked in bringing them the bloody rag or weapon, and so "the finer spirits had escaped", and, of course, the failure was an accident, and no fault of the system. Were I the patient, I would decidedly prefer that the surgeon should bestow his attention on the blood-stained rag, leaving the wound "clean and cool", or swathe the knife which had inflicted the wound in any amount of cabalistically prepared bandages, rather than he should wrap up and overheat the wound with fold after fold of dressing and greasy cerecloth bandages, compressing the parts and confining the bloody and serous discharges. In a word, I would rather that his incantations were performed on something else than my wound.

The truly philosophical views of the adhesive process, taught by John Hunter, gradually led to clearer notions as to the requirement of wounds and the principles on which their treatment should be conducted; and nowhere were these views more fully and intelligently carried out into practice than in this city, mainly through the influence of the writings of John Bell, and subsequently by the treatises of Liston and Syme on the treatment of incised wounds. The principles laid down were simple: thorough cleansing of the cut surfaces, waiting until all oozing had ceased and the surfaces glazed with lymph, before uniting them finally by sutures: cold applied for some hours to moderate excited action, then light dry dressing, and no interference with the wound except what was required to keep it clean. But, at the same time, great attention was paid to the general state of the patient. The results obtained were excellent, and, until recently, this has been the system in use here. But simplicity has sources of failure, for it is apt to lead to carelessness in dressing. We are again in a transition state in regard to the treatment of wounds. The antiseptic method (as it is termed) of my esteemed colleague, Professor Lister, is being pressed in some quarters to the exclusion of conditions which I think, at least equally, if not more, important in the treatment of wounds and operations. This is not the place, nor is there time, to discuss the theory as to production of putrescence by germs from without, or whether that condition may not also arise from within owing to certain states of the blood and general system; nor yet as to the comparative value of the different antiseptics at present contending for pre-eminence. But some of the statements advanced in favour of the antiseptic system so ignore the success obtained by simple dressing and treatment of wounds, or assert such an amount of infallibility as to the curative powers of the special method, as to require notice. When I read statements to the effect, "that the antiseptic method is to be regarded as one of the most important contributions to modern practice, inasmuch as it makes wounds heal by first intention, instead of going through the painful process of granulation and suppuration", I can only regard such statements as arising from want of experience in, or misrepresentation of, the simple method of treating wounds; for, assuredly healing by granulation is neither the object nor yet the general result of that treatment. Suppuration, I believe, is not unknown under the antiseptic method, whilst the average duration of treatment is certainly not lessened. But when I find a German professor and hospital surgeon stating that, after a year and a half's experience of the antiseptic treatment, he is able to guarantee with certainty a perfectly successful result to his

operations, such assertion challenges closer examination, demands proof, and forces me to ask the question, How far, apart from other conditions, do different modes of dressing stand in the relation of cause to successful results? The answer to this important question must rest on sufficient data and carefully weighed statistics. It will not suffice to point to some brilliant results in individual cases, because all methods of treatment can produce that kind of proof; nor will it do to state that no deaths from pyæmia have occurred under the system. At one time, that term was never met with in the bills of mortality, and it is rapidly disappearing now. The statistics for proof must indicate the nature of the disease or injury for which the operation was performed, and the cause of death in fatal cases (for deaths still occur), not by a conventional term, but by giving the symptoms during life, and the organic lesions found after death.

With extensive statistics of this kind, we would be better able to judge of the comparative advantages of different systems of treatment. At present all is assertion or reference to special cases, or to the not very definite statistics of foreign hospitals, and it is not a little curious that we hear most of the success from abroad. I think sufficient time and scope have been given to the antiseptic system in this country to enable those who use it to furnish statistics such as I have indicated, and thus to enable us to judge more dispassionately of its real merits. In comparing of late the results of my own hospital practice, I have been struck with the success which attended very simple treatment, and this leads me to question our progress in departing from such treatment for more complicated methods. Thus I find that, during a period of three years, out of sixty-three major amputations for disease, there were only three deaths; and of twenty-three cases of excision of joints, only two deaths, at a time when the treatment consisted in thoroughly cleansing the cut surface by pouring tepid water over it, and occasionally applying tincture of iodine alone, or diluted, on the flaps; whilst the dressing consisted merely in laying a veil of lint or thin muslin over the stump. Again, when preparing statistics of my amputations for my published lectures, I found evidence that certain conditions, such as the nature of the disease or injury necessitating the operation, had most important influence on the result; such influence, indeed, as I could not have supposed until the statistics brought it distinctly before me, and my later statistics corroborate my former; so that I cannot accept the statement that any method of dressing, however good, will ever enable us to guarantee success. Whilst I speak of the antiseptic system, meaning the special method, I need hardly say that all surgeons have for their object the avoidance of putrescence, though their views may differ as to the best way of attaining their object.

I cannot close without recommending to notice the advantages obtained in treating lacerated wounds and burns of the extremities by continuous immersion in the tepid bath. The avoidance of all meddling with the injured part, and of the agony of the patient caused by changing dressings, is thereby so completely obtained, that the method requires only to be fairly tried to shew its advantages. In the case of burns these advantages are most conspicuous, for the constant moisture keeps the cicatricial tissue pliable, and motion of the parts can be effected gradually, whilst the limb is immersed in the bath. The water may be rendered antiseptic by carbolic or boracic acid should that be considered desirable.

In conclusion, I think the retrospect I have taken shows that when

true principles have been disregarded or lost sight of, they have ultimately had their value recognised, and, modified and improved, have become the advances of the present day ; and so for the future I feel confident, that all that is true and good in any system will emerge with greater beauty and usefulness for having been purged of its dross by the tests of observation and candid criticism.
